3. Subbasin Assessment – Pollutant Source Inventory

This chapter describes the point and nonpoint pollutant sources within the North Fork Payette River watershed. The nonpoint source descriptions are not intended to be specific. Rather, they are descriptions of the general processes whereby pollutants are delivered to the water bodies of concern.

3.1 Sources of Pollutants of Concern

Pollutants can come from both natural and human caused sources. This section provides an inventory of pollutant sources. Pollutant sources in the watershed are both nonpoint and point sources. Land use can be an important factor in pollutant sources and land use is shown in Figure 85.

The point sources are the municipal discharges from wastewater treatment plants (WWTPs). The WWTPs are *National Permit Discharge Elimination System* (NPDES) permitted facilities (Table 38). The cities of Cascade and Horseshoe Bend have WWTPs that discharge directly or indirectly to the Payette River; neither of these facilities discharges directly into a 303 (d) listed segment of the Payette River. The communities of Smiths Ferry and Banks do not have municipal WWTPs; the residents of these areas have private treatment systems or septic systems, some of which may discharge directly or indirectly to the North Fork Payette River or mainstem Payette River.

Point Sources

Table 38. NPDES Point Sources.

Facility	Permit Number	Discharge Limit (million gallons/day)	Permit requirements	Notes
Cascade WWTP	ID 002316-7	0.72	Suspended sediment	Rapid Infiltration
Horseshoe Bend WWTP	ID0021024	0.13	Suspended sediment	Horseshoe Bend upgraded WWTP in 2003

Nonpoint Sources

This description is not intended to be specific. Rather, it is a description of the general processes whereby pollutants are delivered to the water bodies of concern. A detailed description of locations and potential sites for improvement will be located in the final implementation plan.

Phosphorus

Phosphorus is found naturally throughout the environment. It can be present as a constituent of certain rock types (silicous igneous rock) and in the mineral apatite. In the North Fork

Payette River drainage, it is also associated with monazite. The environment itself can also be a factor in the phosphorus levels occurring within a region, due to the climate, pH of natural waters, and the presence of other substances that may adsorb or release phosphorus. However, there are also anthropogenic nutrient sources that greatly increase phosphorus levels over those found naturally. Applied fertilizers in farming or landscaping, the duration and density of livestock grazing, the creation of artificial waterways and water levels through agricultural practices, and the presence of sewage and septic waste (treated and untreated) in the surface, subsurface, and ground water of a region can significantly elevate the phosphorus concentrations in an area.

Nitrogen

Nitrogen occurs in the environment in a variety of sources and forms. It can be present as a mineral constituent of certain rock types; as a result of the decomposition of plant and other organic material; in rainfall, as a component of agricultural or urban/suburban runoff; and as a constituent in treated or untreated wastewater from industrial, municipal, or septic discharges. In addition, the air is composed of about 80% nitrogen gas. Blue-green algae can use atmospheric nitrogen at the surface-water interface or the nitrogen dissolved in the water as a source of nitrogen to support growth. Since algae can use atmospheric nitrogen, reducing nitrogen in the water is not often targeted as a factor to achieve water quality improvements in water systems dominated by blue-green algae. Since reducing watershed-based sources of nitrogen is not usually a successful treatment option in these systems, total phosphorus reductions are often sought.

Sediment

Sediment may originate from natural cause, such as bank erosion, landslides, forest or brush fires, high flow events; or anthropogenic sources such as urban/suburban *stormwater runoff* or erosion from roadways, agricultural lands, and construction sites. Sediment loads within the system are highest in the spring when high flow volumes and velocities result from snowmelt in the higher elevations.

Surface erosion in forested terrain is predominantly a function of slope steepness, soil texture/structure, and the amount of root material in the top few inches of soil. Soil characteristics are generally related to the parent material (i.e. granitics).

Mass failures can be predicted by slope steepness and geologic material as well as other factors, such as whether the area has burned recently or been disturbed by land management activities, such as timber harvest. In general, a few mass failures occur every year, but the major contributors of sediment are the major episodes of mass failure that occur during large rain-on-snow events or during other high precipitation events when the soil mantle becomes supersaturated.

The contribution of mass wasting to sediment loading in the North Fork Payette River drainage has not been quantified but is potentially high in the canyon section of the river below Long Valley. An aerial photographic survey of the canyon did not detect any recent significant landslides.

Roads, depending upon their condition and location, can deliver large sediment loads to streams. In the NFPR watershed, the majority of sediment produced from the road prism is sand sized. The coarse grained granite and gneiss of the basin physically break down between the mineral grains in the rock, producing sand sized particles rather than silt or clay. In areas where basalt is the parent material, it breaks down into silt and clay sized particles.

Road erosion is directly influenced by road use including season of use, type of use (the heavier a vehicle, the greater the breakdown of the road tread into particles), road drainage patterns and road surfacing. Controlling these variables will affect the amount of sediment delivered to streams.

The road cut for Highway 55 in the North Fork Payette River canyon in conjunction with steep hillsides, particularly those slopes that have been burnt or are not heavily treed, has created an increased likelihood of mass wasting events. The sediment load from these events is hard to catch as is establishing the frequency of events. However, these events likely are the biggest single contributor of acute sediment loading to the system.

Temperature

Increases and decreases in water temperature are due to changes in the amount of heat reaching the water. Several factors contribute to the amount of heat reaching the water in the North Fork Payette River watershed. The anthropogenic factors include agricultural return water, agricultural withdrawals, dams, and loss of riparian vegetation (shading). Natural factors include seasonal air temperature changes, natural dams, and naturally warm springs that feed water to the stream. In addition, at times riparian vegetation has been lost both to manmade (i.e. poor grazing practices, off-road vehicle use) and natural causes (i.e. rain-on-snow events). Only those anthropogenic sources that are directly controllable are addressed in this TMDL.

Bacteria

Bacteria enter water bodies in a number of ways. Wastewater treatment plants and failing septic systems are the most common sources in watersheds that contain urban influences. Domestic pet waste can also be a significant source. In rural and agricultural areas the most common sources are domestic animals and wildlife, although failing septic systems can also be a significant source if they are situated adjacent to a water body. In the Payette River system, increased recreational use has created an additional human source of bacteria contamination to the water body due to a lack of bathroom facilities throughout the corridor. Watershed Advisory Group members who have lived in the area for more than 20 years noted that impacts due to recreational use have increased dramatically in the last 10 years. There are facilities at most major river put-ins and take-outs as well as campgrounds, but facilities were lacking in 2004 at the Horseshoe Bend Fish Ladder and the Climax take out.

Oil and Grease

Oil and grease is most commonly found in stormwater runoff and also as a direct discharge from industrial sites. Oil and grease is a general measure of pollution from petroleum compounds. Idaho water quality criteria indicate oil and grease concentrations must be less than levels that impair beneficial uses.

Pollutant Transport

Nutrients

Consideration of flow is important in the evaluation of nutrient, phytoplankton, periphyton, and rooted macrophyte concentrations. In a riverine system, flow transports phytoplankton and nutrients from upstream to downstream in an advective or dispersive transport mode. In other words, riverine systems are dynamic systems in which nutrients are being continually cycled as the water moves downstream. The flow regimen is important in determining the result of this combination of component concentrations. High flows can flush dissolved nutrients downstream, replacing them with the lower concentrations in the high flows. Since nutrient concentrations are inversely related to flow, nutrient retentiveness is much lower in high flow years than in low flow years. High flows can also scour periphyton and rooted macrophytes, reducing their mass considerably. Finally, high flows can scour sediments, causing movement of the sediment downstream and increasing nutrient concentrations at the same time by releasing nutrients tied up in the sediments prior to scouring (IDEQ 2004).

Sediment

While no *quantitative* information is available, it is recognized that a substantial amount of sediment can be generated and transported relatively long distances by extreme precipitation events, such as the January 1997 rain-on-snow event. It has been estimated these events can account for the movement of a greater volume of sediment in a single event than would be expected to occur in an entire water year under average conditions (BCC 1996). Sediment transport, and the transport and delivery of sediment-bound pollutants, are directly associated with increased flow volumes and high velocities. During peak flows, streams with unstable banks may have high sediment loads due to bank erosion.

Bacteria

Bacteria are primarily transported from their point of origin during precipitation and irrigation activities. Bacteria can enter surface water via movement from manured fields, problem feedlots, and overgrazed pastures. Insufficient sewage management systems (septic tanks) may also transport bacteria, especially in areas where the water table is shallow and readily mixes with surface water. Bacteria may also be transported in storm water in areas where storm water is discharged directly to the water body.

Oil and Grease

Oil and grease are transported in storm water runoff and as a result of direct discharge from engines/motors into water bodies.

3.2 Data Gaps

The best available data were used to develop the current subbasin assessment and TMDL. The data were used to reach conclusions of support status and to develop defensible TMDLs. However, DEQ acknowledges there are additional data that would be helpful to increase the accuracy of the analyses. The data gaps that have been identified are outlined in Table 39.

Point Sources

No data gaps.

Nonpoint Sources

Table 39. Pollutant Source Data Gaps Identified During TMDL Development.

Pollutant or Other Factor	Data Gap
Sediment	Bedload sediment in North Fork Payette River
Temperature	Additional instream temperature information during salmonid spawning season

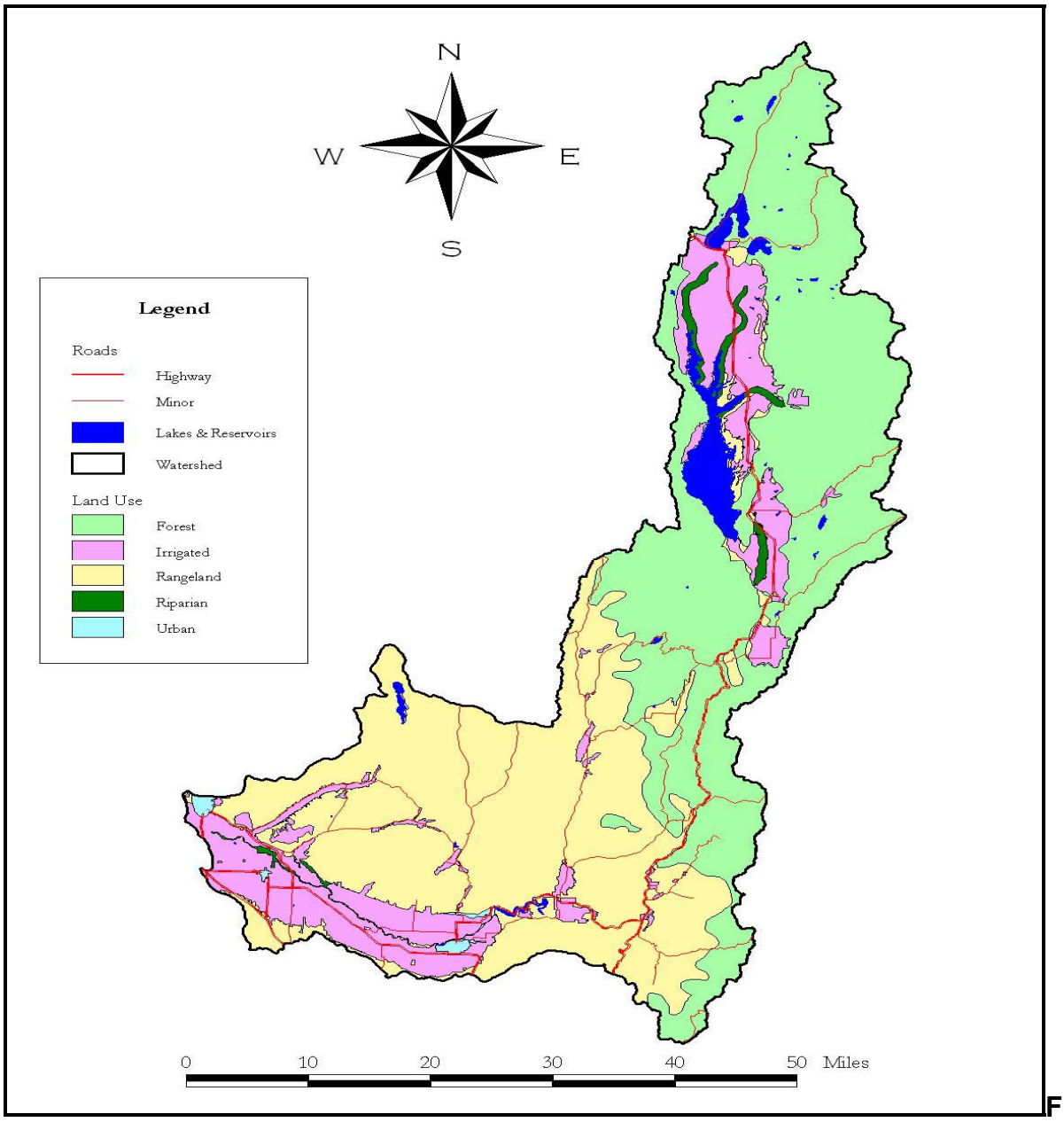

Figure 85. Land Cover and Land Use.